

Claims

- [c1] An apparatus for percutaneously implanting a localization wire within a tissue mass, comprising:
- a cannula defining a lumen and having a distal end forming an insertion tip;
 - a localization wire located within the lumen and having a distal end near the insertion tip when the cannula is in the insertion position; and
 - an actuator in operable communication with the cannula and operable between a charged condition and a discharged condition to effect the relative movement of the cannula and the localization wire to expose the distal end of the localization wire to the tissue mass;
- wherein, to implant the localization wire into the tissue mass, the cannula is inserted into the tissue mass and the actuator is placed in the discharged condition to effect relative movement of the cannula and the localization wire and expose the distal end of the localization wire to the tissue mass.
- [c2] The apparatus of claim 1 wherein the insertion tip is sharpened to aid in the insertion of the cannula into the tissue mass.
- [c3] The apparatus of claim 1 wherein the cannula further comprises at least one imageable portion.
- [c4] The apparatus of claim 3 wherein the at least one imageable portion comprises multiple spaced imageable portions.
- [c5] The apparatus of claim 1 wherein the localization wire comprises at least one anchor for holding the localization wire in the tissue mass.
- [c6] The apparatus of claim 5 wherein the anchor extends beyond the distal end of the cannula when the actuator effects the relative movement of the cannula and

localization wire.

- [c7] The apparatus of claim 5 wherein the at least one anchor comprises opposing anchors.
- [c8] The apparatus of claim 7 wherein the opposing anchors comprise at least two opposing anchors that are radially offset.
- [c9] The apparatus of claim 8 wherein the opposing anchors are arranged in sets.
- [c10] The apparatus of claim 5 wherein the at least one anchor is a barb.
- [c11] The apparatus of claim 10 wherein the barb is integrally formed with the localization wire.
- [c12] The apparatus of claim 1 wherein the localization wire comprises an imageable portion.
- [c13] The apparatus of claim 12 wherein the imageable portion comprises a change in contour of the wire.
- [c14] The apparatus of claim 1 wherein the actuator retracts the cannula relative to the localization wire from an insertion position to an implant position to effect the relative movement of the cannula and localization wire and expose the distal end of the localization wire.
- [c15] The apparatus of claim 14 wherein the actuator comprises a slide that is manually moved by the user from the charged to the discharged condition to retract the cannula relative to the localization wire.
- [c16] The apparatus of claim 14 wherein the actuator automatically retracts the cannula relative to the localization wire.

- [c17] The apparatus of claim 16 wherein the actuator comprises a biasing element coupled to the cannula to move the cannula from the insertion position to the implant position.
- [c18] The apparatus of claim 17 wherein the actuator comprises a trigger operable between a ready position and a release position for controlling the operation of the biasing element.
- [c19] The apparatus of claim 18 wherein the biasing element is a spring in operable communication with the trigger such that movement of the trigger from the ready position to the release position releases the spring from a compressed state to an expanded state to move the cannula from the insertion position to the implant position.
- [c20] The apparatus of claim 19 and further comprising a handle defining a hollow interior and an end, with the cannula being slidably mounted to the end.
- [c21] The apparatus of claim 20, wherein the handle comprises a base and a grip, with the grip being slidably mounted to the base for movement between a first position, where the cannula and localization wire are substantially received within the grip, and a second position, where the cannula and localization wire are substantially exteriorly of the grip.
- [c22] The apparatus of claim 21, wherein when the grip is moved to the second position, the actuator is moved to the charged condition.
- [c23] The apparatus of claim 22, wherein the spring is disposed between the base and the grip and the spring is compressed when the grip is moved to the second position.
- [c24] The apparatus of claim 21, wherein the cannula has a proximal end mounted to

the base.

- [c25] The apparatus of claim 20, wherein the spring is located within the hollow interior and extends between the end and a collar extending from the cannula.
- [c26] The apparatus of claim 25, wherein the trigger is pivotally mounted to the handle and includes a finger that abuts the collar when the trigger is in the ready position, and can be pivoted to the release position to remove the finger from abutting contact with the collar to release the spring.
- [c27] The apparatus of claim 25, wherein the collar forms a key and the apparatus further comprises a keyway shaped for receiving the key, and wherein the key is unaligned from the keyway when the actuator is in the charged condition and is aligned with the keyway when the actuator is in the discharged condition.
- [c28] The apparatus of claim 27, wherein the trigger is rotatably mounted to the handle and operably coupled to the key such that rotation of the trigger aligns the key with the keyway to thereby release the spring.
- [c29] The apparatus of claim 27, wherein the trigger forms the keyway and displacement of the trigger to the release position aligns the key with the keyway to thereby release the spring.
- [c30] The apparatus of claim 20, wherein the localization wire is contained entirely within the cannula and the handle.
- [c31] The apparatus of claim 1, and further comprising a handle having a base mounting a proximal end of the cannula, and a grip slidably mounted to the base for movement between a first position, where the cannula is substantially received within the grip, and a second position, where the cannula is substantially exteriorly of the grip.

- [c32] The apparatus of claim 31 wherein when the grip is moved to the second position, the actuator is moved to the charged condition.
- [c33] The apparatus of claim 32 wherein the actuator comprises a spring positioned within the grip and extending between the base and the grip, wherein when the grip is in the second position, the spring is in a compressed state.
- [c34] The apparatus of claim 33 wherein when the actuator is moved to the discharged condition, the spring is released from the compressed state.
- [c35] The apparatus of claim 1 wherein the actuator automatically effects the relative movement between the cannula and the localization wire.
- [c36] An apparatus for percutaneously implanting a localization wire within a tissue mass, comprising:
a handle with a hollow interior and an end;
a cannula defining a lumen and having a distal end forming an insertion tip;
a localization wire located within the lumen and having a distal end near the insertion tip when the cannula is in the insertion position; and
an actuator operable between a charged condition and a discharged condition to effect relative movement of the cannula and the localization wire to expose the localization wire to the surrounding tissue mass;
wherein the handle, the cannula, the localization wire, and the actuator form a self-contained implanting apparatus for implanting the localization wire into the tissue mass, whereby the cannula is inserted into the tissue mass and the actuator is placed in the discharged condition to effect the relative movement of the cannula and localization wire expose the distal end of the localization wire to the tissue mass.

- [c37] The apparatus of claim 36 wherein the actuator retracts the cannula relative to the localization wire from an insertion position to an implant position to effect the relative movement of the cannula and localization wire and expose the distal end of the localization wire.
- [c38] The apparatus of claim 37 wherein the actuator automatically effects the relative movement between the cannula and the localization wire.
- [c39] The apparatus of claim 38 wherein the actuator comprises a biasing element operably coupled to the cannula to move the cannula from the insertion position to the implant position.
- [c40] The apparatus of claim 39 wherein the actuator comprises a trigger operable between a ready position and a release position for controlling the operation of the biasing element.
- [c41] The apparatus of claim 40 wherein the biasing element is a spring operably coupled to the trigger such that movement of the trigger from the ready position to the release position releases the spring from a compressed state to an expanded state to move the cannula from the insertion position to the implant position.
- [c42] The apparatus of claim 41, wherein the spring is located within the hollow interior and extends between the end and a collar extending from the cannula.
- [c43] The apparatus of claim 42, wherein the trigger is pivotally mounted to the handle and includes a finger that abuts the collar when the trigger is in the ready position, and can be pivoted to the release position to remove the finger from abutting contact with the collar to release the spring.
- [c44] The apparatus of claim 42, wherein the collar forms a key and the apparatus further comprises a keyway shaped for receiving the key, and wherein the key is

unaligned from the keyway when the actuator is in the charged condition and is aligned with the keyway when the actuator is in the discharged condition.

[c45] The apparatus of claim 44, wherein the trigger is rotatably mounted to the handle and operably coupled to the key such that rotation of the trigger aligns the key with the keyway to thereby release the spring.

[c46] The apparatus of claim 44, wherein the trigger forms the keyway and displacement of the trigger to the release position aligns the key with the keyway to thereby release the spring.

[c47] The apparatus of claim 36, wherein the localization wire is contained entirely within the cannula and the handle.

[c48] The apparatus of claim 47 wherein the localization wire comprises at least one anchor for holding the localization wire in the tissue mass.

[c49] The apparatus of claim 48 wherein the at least one anchor comprises opposing anchors.

[c50] The apparatus of claim 49 wherein the at least one anchor is a barb.

[c51] The apparatus of claim 50 wherein the barb is integrally formed with the localization wire.

[c52] The apparatus of claim 49 wherein the localization wire comprises an imageable portion.

[c53] The apparatus of claim 52 wherein the cannula further comprises at least one imageable portion.

[c54] The apparatus of claim 53 wherein the at least one imageable portion comprises

multiple spaced imageable portions.

- [c55] The apparatus of claim 53 wherein the insertion tip is sharpened to aid in the insertion of the cannula into the tissue mass.
- [c56] The apparatus of claim 36, wherein the handle further comprises a base mounting a proximal end of the cannula, and a grip slidably mounted to the base for movement between a first position, where the cannula is substantially received within the grip, and a second position, where the cannula is substantially exteriorly of the grip.
- [c57] The apparatus of claim 56 wherein when the grip is moved to the second position, the actuator is moved to the charged condition.
- [c58] The apparatus of claim 57 wherein the actuator comprises a spring positioned within the grip and extending between the base and the grip, wherein when the grip is in the second position, the spring is in a compressed state.
- [c59] The apparatus of claim 58 wherein when the actuator is moved to the discharged condition, the spring is released from the compressed state.
- [c60] A method of percutaneously implanting a localization wire into a tissue mass, the method comprising the steps of:
- providing an apparatus comprising a cannula defining a lumen and having a distal end forming an insertion tip; a localization wire pre-loaded within the lumen and having a distal end near the insertion tip; and an actuator connected to the cannula and operable between a charged condition and a discharged condition to effect relative movement of the cannula and the localization wire to expose the distal end of the localizing wire;
- inserting the insertion tip of the cannula and the localization wire into the tissue

mass; and

operating the actuator to relatively move the cannula and the localization wire to expose a portion of the distal end of the localization wire to the tissue mass.

- [c61] The method of claim 60 wherein the moving step comprises manually relatively moving the cannula and the localization wire.
- [c62] The method of claim 60 wherein the manual relative movement of the cannula and the localization wire comprises manually retracting the cannula relative to the localization wire.
- [c63] The method of claim 60 wherein the moving step comprises automatically relatively moving the cannula and the localization wire.
- [c64] The method of claim 63 wherein the moving step comprises retracting the cannula relative to the localization wire.
- [c65] The method of claim 64 wherein the moving step further comprises displacing a trigger on the actuator to release a biasing element operably coupled to the cannula and thereby automatically retract the cannula.
- [c66] The method of claim 65 wherein the retracting step further comprises retracting the cannula into an end of a handle with a hollow interior.
- [c67] The method of claim 66 wherein the moving step comprises removing the cannula from the tissue mass.
- [c68] The method of claim 60 wherein the insertion step further comprises using an imaging system for locating one of the cannula and the localization wire in the tissue mass.
- [c69] The method of claim 68 wherein the insertion step comprises locating the insertion

tip of the cannula at a predetermined location within the tissue mass so that during the moving step, the localization wire is exposed to the predetermined location.

[c70] The method of claim 69 wherein the predetermined location is at a biopsy site so that during the moving step, the localization wire is located at the biopsy site.

[c71] The method of claim 60 wherein the insertion step comprises positioning an imageable portion on the cannula at a predetermined location within the tissue mass.

[c72] The method of claim 60 wherein the insertion step comprises positioning at least one anchor on the localization wire at a predetermined location within the tissue mass so that during the moving step, the at least one anchor is embedded into the tissue mass at the predetermined location.

[c73] The method of claim 60 and further comprising a step of locating an imageable portion of the localization wire at a predetermined location within the tissue mass.

[c74] The method of claim 73 wherein the predetermined location is at a biopsy site.

[c75] The method of claim 60 and further comprising a step of moving a handle grip of the apparatus relative to a handle base of the apparatus from a first position, where the cannula is substantially received within the handle grip, to a second position, where the cannula is substantially exteriorly of the handle grip.

[c76] A localization wire, comprising:
a shaft defining a longitudinal axis; and
first and second anchors extending from the shaft in opposing relationship.

[c77] The localization wire of claim 76, wherein the first anchor comprises at least one first barb, and the second anchor comprises at least one second barb.

- [c78] The localization wire of claim 77, wherein there are multiple first and second barbs and which are arranged in sets.
- [c79] The localization wire of claim 78, wherein the at least one first barb and the at least one second barb are radially offset relative to the longitudinal axis.
- [c80] The localization wire of claim 79, wherein there are multiple first barbs.
- [c81] The localization wire of claim 80, wherein there are multiple second barbs.
- [c82] The localization wire of claim 81, wherein the multiple first and second barbs are arranged in sets.